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(71) Applicants *(for all designated States except US)*: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE). TELIA AB [SE/SE]; S-123 86 Farsta (SE).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: KANTER, Theo [NL/SE]; Rönninge skolväg 35E, S-144 62 Rönninge (SE).

(74) Agents: HERBJØRNSEN, Rut et al.; Albihns Patentbyrå Stockholm AB, P.O. Box 3137, S-103 62 Stockholm (SE).

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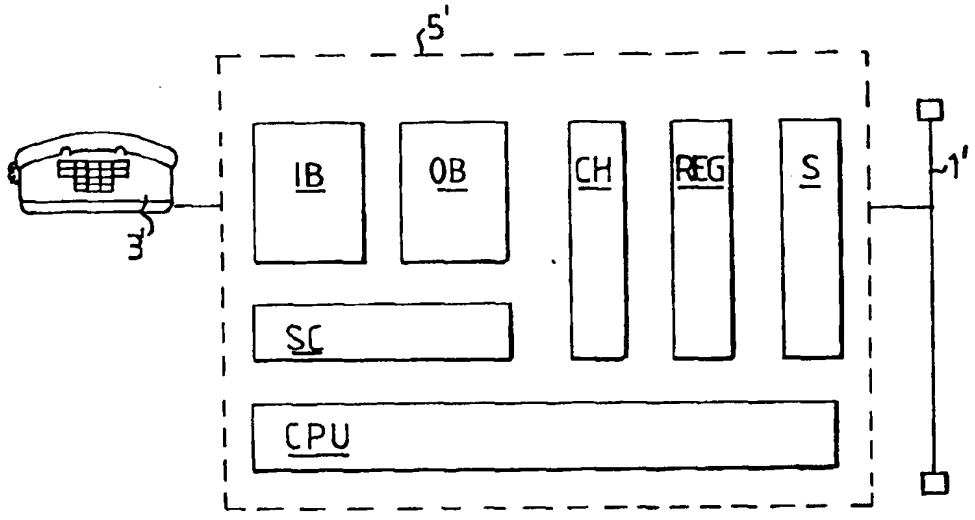

(57) Abstract

The present invention relates to an apparatus and a method for allowing ordinary telephones to connect to a data network. An adaptation means (5; 5') is used between the telephone (3; 3') and the data network (1; 1'), said adaptation means (5; 5') comprising means for the buffering, and compressing/decompressing of speech data and conversion of speech data into data packets and vice versa.

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METHOD AND APPARATUS FOR ALLOWING ORDINARY TELEPHONES TO CONNECT TO A DATA NETWORK

Technical Field

The present invention relates to a method and an apparatus for connecting ordinary telephones to data communication networks.

Background

The use of the Internet, and of other Internet Protocol (IP) type networks is increasing rapidly. However connections to such networks requires fairly expensive hardware, such as a Personal Computer (PC).

Telephones are generally available everywhere and they are easy to use. There is therefore a desire to provide an interface which will allow the use of an ordinary telephone for connecting to IP networks, even though it will not be possible to utilize all the possibilities offered by such a network, using only a telephone.

Summary of the Invention

It is an object of the present invention to provide a connection from an ordinary telephone to a data network without the need for additional hardware.

It is another object of the present invention to provide a connection from a telephone to a data network which is inexpensive compared to the solutions currently available, and easy to install and maintain.

These will be particularly useful for TCP/IP networks, which are most commonly used for data communications today.

The objects are achieved by the present invention by providing an adapter between the telephone and the data network connector which carries out the following functions:

- termination of the data protocol used

- responding to incoming telephone calls over the data network
- translation of off-hook positions and digits dialled to configurable call requests that are handled by the Internet telephony system.
- translation of incoming calls from the Internet telephone system into dial-tone and on/off hook positions to establishment of a call
- bidirectional translation of speech data according to the appropriate coding.
- reconfiguration of the Reg., CH and SC functions from the data network.

The adapter may be implemented as a microprocessor and placed inside the telephone housing. The ordinary telephone jack is then replaced by the data network connector.

The solution according to the invention offers the following advantages:
An inexpensive way of connecting an ordinary telephone to a data network, such as a TCP/IP network and to an Internet telephone system is provided.
The adapter is configurable from the data network and may therefore be adapted to the changing requirements on speech coders/decoders, Internet telephony registration procedures, call request and call out procedures.

The equipment required according to the invention is easy to install for the user, as everything may be assembled and configured by the manufacturer before installation.

Brief Description of the Drawings

Figure 1 is a schematic drawing of a data network to which telephones are connected through adapters according to the invention;
Figure 2 is a schematic drawing of a telephone connection to a IP network through an adapter according to the invention;
Figure 3 is a flow chart of the activities carried out when an outgoing call is being set up;
Figure 4 illustrates schematically the communication in the adapter in the set-up phase of a call;

Figure 5 illustrates schematically the communication in the adapter while a call is being made;
Figure 6 shows the connection of a mobile or cellular telephone to a data network according to the invention.

Detailed Description of Embodiments

Figure 1 shows an data network 1, to which a number of subscribers are connected. In this figure, and in the following discussion, the data network is taken to be a TCP/IP network, as this is the most commonly used network protocol today.

In Figure 1, two telephone subscribers 3 are connected to the network through adapters 5 according to the invention. The adapter 5 may be comprised in the telephone housing or anywhere between the telephone and the IP network. If the adapter is integrated in the telephone, the telephone may be connected to the IP network in the same way as a computer. Some of the ordinary telephone functions could then be omitted.

In addition any number of computers 7, for example personal computers or workstations, connected to the IP network either via leased lines or via modem, or in any other way common in the art.

Through the adapter 5 according to the invention, calls may be established from any subscriber 3 to any other terminal 3, 7 in the network.

Figure 2 shows a telephone 3' connected to an IP network 1' through an adapter 5' according to the invention.
The adapter 5' comprises the following units:
An input buffer IB and an output buffer OB, which buffer the audio packages to be transmitted on the network and received from the network, respectively.

A Speech Coder/Decoder SC, which encodes speech so that it can be transmitted on the IP network, which is packet switched, and decodes incoming packets containing speech, so that they can be received in the telephone.
A Call Handler CH, which translates dialling and hook positions into configurable call requests that are handled by the Internet telephony system, and translates incoming calls from the Internet telephony system into dialling-tones and establishes calls
A register block REG, which stores information about the Internet telephony A number. This number may be configured by a user using the telephone or from the IP network.
A TCP/IP stack S for communication with the IP network
A Central Processing Unit CPU which controls the functions of the other blocks in the adapter 5.

Figure 3 is a flow chart of the actions performed when a telephone subscriber connected to the IP networks by an adapter according to the invention, wants to make a phone call.

Step S31: The user lifts the hook and an off-hook signal is transmitted to the Call Handler CH. The signalling is done in a way common in the art, for example by Dual Tone Multi Frequency (DTMF) signalling or voice control between the telephone and the adapter. If the adapter is implemented as part of the telephone, an I/O circuit in the adapter connects the keyboard directly to the CPU of the adapter.

Step S32: The Call Handler CH retrieves the A number from the register REG.

Step S33: The Call Handler CH signals to the TCP/IP stack that a connection through the IP network is requested.

Step S34: Signalling takes place between the TCP/IP stack and the network in a way common in the art, for example, in the way defined in the H.323 protocol.

Step S35: When an OK has been received from the B subscriber, the connection from the A subscriber to the B subscriber is set up through the network.

Figure 4 shows the connections between the units in the adapter that are used in the set-up phase of a call. The adapter is identical to the one shown in Figure 2. The Call Handler CH detects the off-hook state of the telephone and requests the A number from the register REG. The Call Handler then requests the TCP/IP stack to set up the connection to the network in the way common in the art.

Figure 5 shows the path taken by the speech through the adapter after the connection has been set up. The adapter shown is identical to the one shown in Figure 2.

First, the outgoing data is stored in the input buffer IB. When the input buffer IB is full, the data is forwarded to the signal coder/decoder SC via the central processing unit CPU. The signal coder/decoder SC compresses the data and forwards it via the central processing unit CPU to the TCP/IP stack, where the header field is added, before the packet is transmitted to the local area network. Through the IP network the data packages are transmitted in the way common in the art.

When a phone call is received, the Call Handler CH verifies that the call is intended for the subscriber connected to this adapter and initiates the set-up of the call through the TCP/IP stack. The connections are similar to the ones shown in Figure 5, except that the output buffer OB is used instead of the input buffer IB. How to implement this is known to the skilled person.

A phone call is ended when one of the users replaces the hook on the telephone.

Figure 6 shows a possible connection between a mobile, or cellular, telephone 11 and a data network 13 according to the invention. The mobile telephone 11 comprises the standard telephony functions 15, an adapter 17 according to the invention, that is, with similar functions to the adapters 5, 5' shown in the previous drawings, and a radio communication unit 19. The connection to the network is a radio connection, and thus a communication unit 21 is needed at the entrance to the network as well.

Patent Claims

1. An adaptation means (5; 5') for enabling the connection of ordinary telephones to data networks, characterized in that it comprises:
- means (REG) for registering the adaptation means (5; 5') and/or the telephone connection in the data network (1; 1');
- means (CH) for handling incoming call requests, based on the identity of the adapter (5; 5') or the telephone connection;
- means (IB, OB) for buffering the incoming and outgoing data packets;
- means (SC) for compressing and/or decompressing speech data;
- means (S) for converting speech data into data packets and vice versa;
- means (CH) for translating on/off hook and key dialling into outgoing call requests.

2. An apparatus according to claim 1, characterized in that the address of the adapter and/or the telephone connection may be configured from the telephone connected to the adapter.

3. An apparatus according to claim 1 or 2, characterized in that the address of the adapter and/or the telephone connection may be configured from another terminal in the data network.

4. An apparatus according to any one of the preceding claims, characterized it is adapted to select the compression standard to be used may from the telephone connected to the adapter.

5. An apparatus according to any one of claims 1-3, characterized in that it is adapted to negotiate the compression standard to be used according to the capabilities of the terminals participating in the connection.

6. A telephone, characterized in that it comprises an apparatus according to any one of claims 1-5.

7. A method for enabling the connection of ordinary telephones to a data network, characterized by the following steps:
- Storing the identity of the telephone in a register (REG);
- Registering an off-hook state of the telephone in a Call Handler (CH);
- Signalling to the data network through a data protocol stack to establish a connection;
- Buffering the outgoing speech data in an output buffer (OB);
- Converting outgoing speech data into data packets;
- Converting incoming data packets into speech data;
- Buffering the incoming speech data in an input buffer (IB).

8. A method according to claim 7, characterized in that the signalling to the data network comprises the following steps:
- requesting a communication capability from the data protocol stack;
- confirming the communication capability to the data protocol stack;
- establishing the connection.

9. A method according to claim 7 or 8, characterized by selecting the compression standard to be used may be selected from the telephone connected to the adapter.

10. A method according to any one of claims 7-9, characterized by negotiating the compression standard according to the capabilities of the terminals participating in the connection.

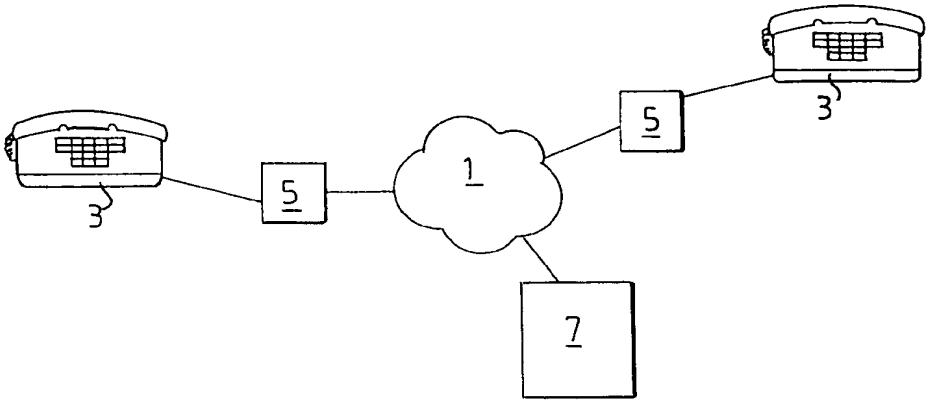

FIG.1

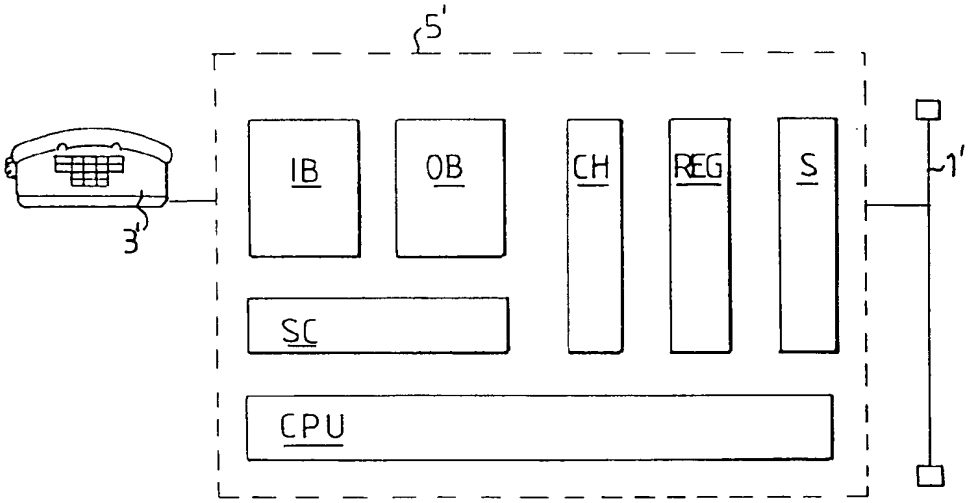

FIG. 2

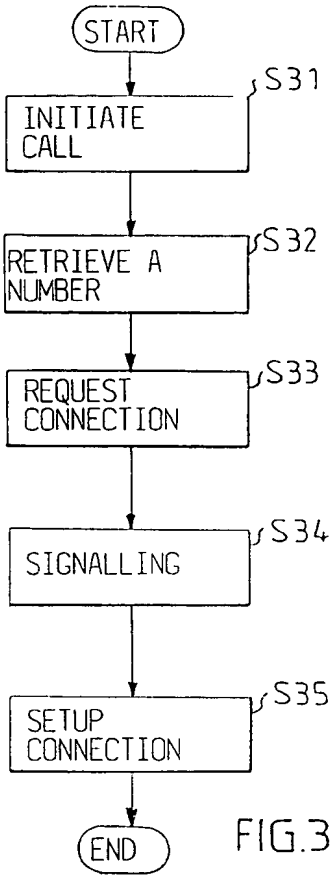
START
INITIATE CALL
S31
RETRIEVE A NUMBER
S32
REQUEST CONNECTION
S33
SIGNALLING
S34
SETUP CONNECTION
S35
END

FIG.3

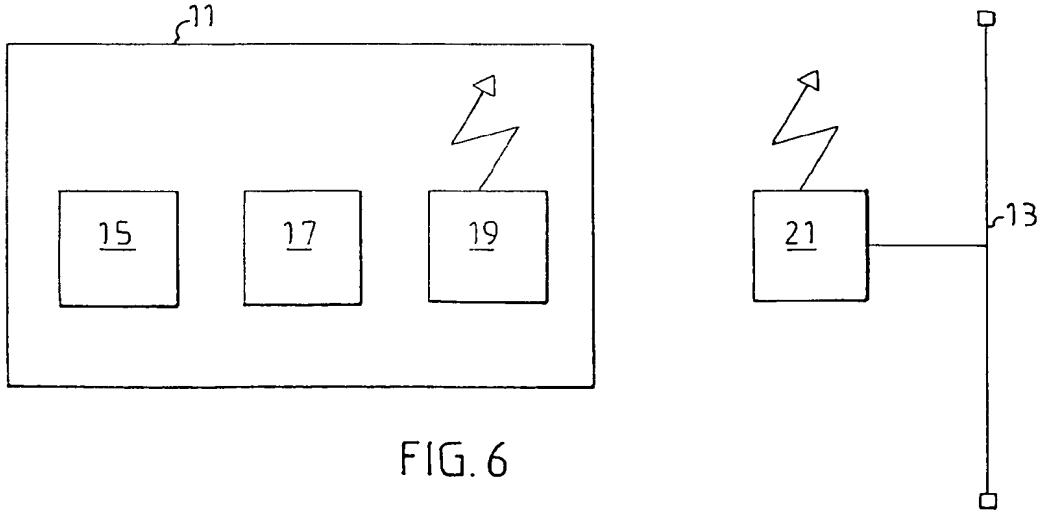
11
15
17
19
21
13

FIG. 6

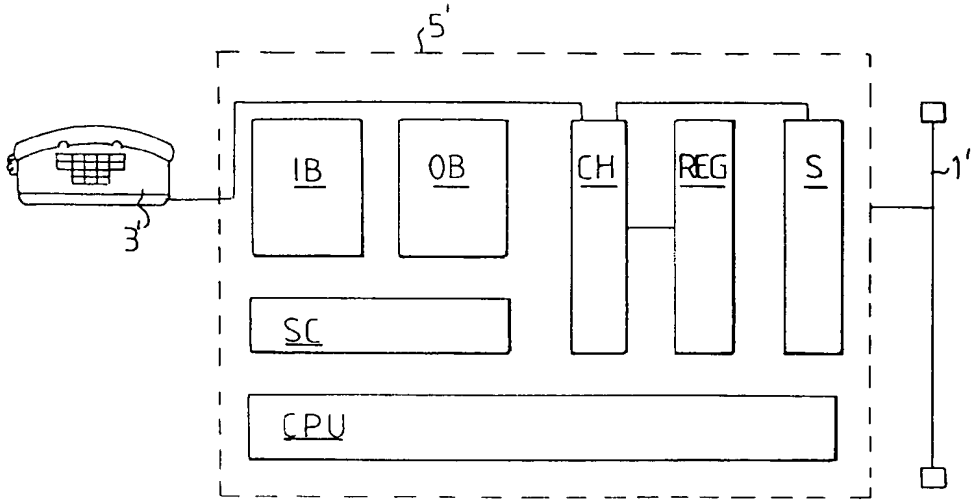

FIG.4

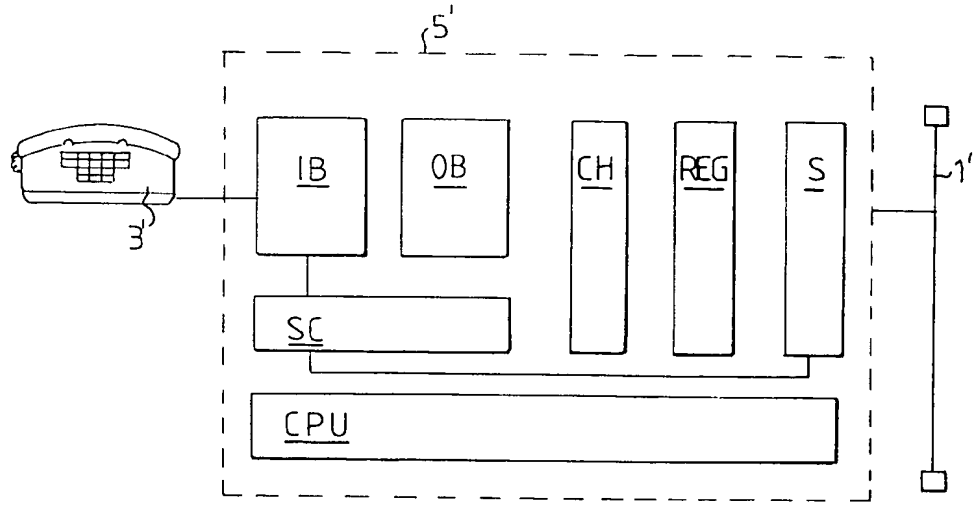

FIG.5